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EXAMINER	
BHATNAGAR, ANAND P	

ART UNIT	PAPER NUMBER
2623	

DATE MAILED: 08/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/769,599	KRAVETS ET AL.	
	Examiner	Art Unit	
	Anand Bhatnagar	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 February 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Arguments

1. Applicant's amendment filed on 02/23/05 has been entered and made of record.

2. Applicant has amended claims 1,11, 15, 16, and 22. Currently, claims 1-25 are pending.

3. Applicant in essence argues that applicant's instant invention extracts motion information from an image sequence, then determines spatial patterns from the motion information and these spatial patterns represent trajectories of objects moving within the imaged scene and that neither reference of Courtney (U.S. patent 5,969,755) nor Gran et al. (U.S. patent 5,416,711) alone or in combination teaches the newly added limitation (claims 1, 11, 15, 16, and 22) of "the spatial patterns represent trajectories of objects in the sequence of images." Examiner disagrees. Examiner believes that the prior art of Courtney either alone or in combination with Gran et al. teaches this new limitation. Courtney teaches to obtain images of a scene then extract the motion from the images then perform object tracking on the images (Courtney; fig. 1, fig. 3, fig. 4, fig. 5 elements 11, 21, 22, and 23, col. 3 lines 1-8, col. 4 lines 47-61, and col. 7 lines 43-61). Here the system obtains the sequence of images of a scene performs the motion segmentation, a motion graph ("spatial pattern") of the motion determined (fig. 4, read as the "spatial pattern" since it is of a the motion of an object through a real 3D space which an example is shown in fig. 3 wherein the scene/3D space is a room) from which the object path/trajectory is determined (Courtney; col. 4

lines 47-61 and col. 7 lines 43-51, wherein the path and trajectories are determined). Further, the prior art of Gran et al. teaches to observe objects moving through a corridor, which is read as a trajectory, since the objects are moving through this corridor and some of the moving objects move through the whole corridor, making this the path of these objects, while some others turn off this corridor (Gran et al.; fig. 6 and col. 8 lines 24-37). As defined by The American Heritage College Dictionary, fourth edition, a trajectory is "The path of a projectile or other moving body through space," therefore; examiner takes the corridor as equivalent to being a trajectory in this situation. As discussed above Gran et al. teaches to monitor moving objects through a corridor and which objects enter and exit this corridor and which ones turn off the corridor which is read as determining/detecting the paths/trajectories of the moving objects in the corridor. For the arguments made above examiner believes that Courtney and Gran et al. either alone or combined teach the newly added limitation in the claims discussed. Examiner refers to the rejection below.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

A.) Claims 1, 4, 8, 11, 12, and 15-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Courtney (U.S. patent 5,969,755) and Gran et al. (U.S. patent 5,416,711).

Regarding claims 1 and 16: Courtney discloses a method for performing motion analysis on a sequence of images (Courtney; figs. 2-4 and col. 3 lines 1-2), where said sequence of images captures a plurality of objects each moving along a trajectory in an imaged area (Courtney; figs. 9-12, col. 3 lines 1-8, and col. 7 lines 47-51), said method comprising:

extracting motion information for each of said plurality of objects contained in said sequence of images (Courtney; col. 4 lines 29-31 and 54-61, wherein the information is segmented from the images in order to obtain the stationary and moving objects), and

determining spatial patterns from said extracted motion information, the spatial patterns represent trajectories of objects in the sequence of images (Courtney; fig. 1, fig. 3, fig. 4, fig. 5 elements 11, 21, 22, and 23, col. 3 lines 1-8, col. 4 lines 47-61, and col. 7 lines 43-61, wherein the paths of the objects are determined from the segmented/extracted information. These paths are read as spatial patterns and as the routes of the objects, also see examiner's rebuttal above), where said

determining step comprises determining a route comprising a trajectory of a first object having the same trajectory of at least one other object.

Courtney discloses to obtain moving and stationary objects within a video/sequence of images by determining the paths/routes/trajectories of the objects. Courtney does not disclose to obtain determining the "route comprising a trajectory of a first object having the same trajectory of at least one other object." Gran et al. teaches to determine the route of a first object having the same trajectory of at least one other object (Gran et al.; col. 2 lines 59-68 and col. 8 lines 24-34, wherein a traffic corridor, read as a "trajectory" of the traffic, is monitored to observe the length of the traffic queue and/or the number of vehicles in the traffic queue. Determining the number of vehicles within the traffic queue/corridor is read as determining of "a trajectory of a first object having the same trajectory of at least one other object," since more than one object is determined in the same traffic corridor "trajectory."). It would have been obvious to one skilled in the art to combine the teaching of Gran et al. to that of Courtney because they are analogous in monitoring moving objects/traffic patterns (Courtney; col. 11 lines 1-4 and Gran et al.; col. 1 lines 7-10). One in the art would have been motivated to incorporate the teaching of Gran et al. to the system of Courtney in order to provide an efficient and safe utilization of the nation's roads and highway systems (Gran et al.; col. 1 lines 26-28).

Regarding claims 4, 20, and 24: The method of claim 1 wherein said determining of spatial patterns comprises:

determining a source point and a destination point from said trajectory of said plurality of objects (Courtney; col. 4 lines 62-67, wherein the entrance and

exit points of the moving and stationary objects are determined, which are read as source and destination points, respectively).

Regarding claim 8: The method further comprising:

determining spatio-temporal patterns from said determined spatial patterns along a time dimension (Courtney; col. 4 lines 7-11, wherein the events are spatio-temporal).

Regarding claims 11 and 12: They are rejected for the combination of reasons of claim 1,9, and 10.

Regarding claim 15: It is rejected for the same reasons as claim 1 above and for the following limitation of a method for displaying motion information of objects contained in a sequence of images (Courtney; fig. 5 elements 19 and 27-29), the method comprising:

performing a query on a plurality of spatial patterns stored in a database, where each of said plurality of spatial patterns comprises a route determined from a trajectory common to at least two objects moving in an imaged area captured in said sequence of images and displayed on a user interface (Courtney; fig. 5 elements 27-29 and col. 5 lines 12-20 and 43-51).

Regarding claim 17. The system further comprising a video source for capturing said plurality of objects in an imaged area and transmitting video containing said captured plurality of objects to said motion extraction system (Courtney; fig. 5 elements 11, 15, and 21-23, wherein a video camera obtains images and the images are then analyzed for motion).

Regarding claim 18: The system further comprising:

a database for storing said spatial patterns determined from said motion mining system (Courtney; fig. 5 element 15); and

a server computer for retrieving said trajectory satisfying at least one constraint specified in a query (Courtney; fig. 5 elements 27 and 28).

Regarding claims 19 and 23: It is rejected for the same reasons as claim 1.

Regarding claims 21 and 25: The system wherein said motion mining system determines spatio-temporal patterns from said spatial patterns along a time dimension (Courtney; col. 4 lines 7-11, wherein the events are spatio-temporal).

Regarding claim 22: It is rejected for the same reasons as claim 1 and for the following limitations of:

a memory for storing a motion mining program (Courtney; fig. 5 element 15);

an interface (Courtney; fig. 5 elements 27 and 28);

a processor (Courtney; fig. 5 elements 27 and 28).

B.) Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Courtney (U.S. patent 5,969,755), as modified by Gran et al. (U.S. patent 5,416,711), and further in view of Koike (U.S. patent 6,445,308 B1).

Regarding claim 3: Courtney discloses to obtain moving and stationary objects within a video/sequence of images by determining the paths/routes/trajectories of the objects. Courtney, as modified by Gran et al., teaches to obtain a number of objects within the same trajectory. Neither Courtney nor Gran et al. teach to "determining whether said trajectory of a second object is within a threshold distance said trajectory of said first object and including, if said trajectory of said second object is within the threshold distance, said trajectory of said second object in said route." Koike teaches this limitation wherein the trajectory of the first object is determined to be within a threshold value of the trajectory of a second object (Koike; fig. 20 and col.17 lines 36-44 and 54-59, wherein a threshold is used to determine the possibility of a collision based on the objects trajectories, i.e. two moving object trajectories coming within a certain distance/threshold). It would have been obvious to one skilled in the art to combine the teaching of Koike to the disclosure of Courtney, as modified by Gran et al., because they are analogous in determine object motion path using trajectories. One in the art would have been motivated to incorporate the teaching of Koike to the system of Courtney, as modified by Gran et al., "to avert a collision with another vehicle by obtaining accurate motion information" (Koike; col. 1 lines 63-64).

C.) Claims 5, 6, 9, 10, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Courtney (U.S. patent 5,969,755), as modified by Gran

et al. (U.S. patent 5,416,711), and further in view of Krause et al. (EP 740280 A2).

Regarding claims 5, 6, and 13: Courtney discloses a system to determine multiple objects in motion within a video. Courtney further discloses to determine the objects entry and exit points (Courtney; col. 4 lines 62-67, wherein the entry and exit points are read as the source and destination points, respectively). Courtney, as modified by Gran et al., does not teach "determining whether a number of trajectories originating from a location is greater than a threshold number and identifying, if the number of trajectories originating from the location Is greater than the threshold number, the location as said source point" nor do they teach "determining whether a number of trajectories ending at a location is greater than a threshold number and identifying, if the number of trajectories ending at the location is greater than the threshold number, the location as said destination point." Krause et al. teaches to look at the number of cars coming into a sector/region and the number of cars at the end of the sector to determine against a threshold value if there is a hold up in that traffic sector (Krause et al.; English translated version of the abstract which has been provided). It would have been obvious to one skilled in the art to combine the teaching of Krause et al. to that of Courtney, as modified by Gran et al., because they are analogous in traffic monitoring. One in the art would have been motivated to incorporate the teaching of Krause et al., modified to threshold the trajectories for their number of entrance points and their exit points and label them accordingly, to the system of

Courtney, as modified by Gran et al., in order to determine the traffic level and speed (Krause et al.; abstract).

Regarding claims 9 and 10: Courtney discloses a system wherein the motion of objects in a video are determined. Courtney further discloses to obtain the events as spatio-temporal information wherein the movements will be recorded according to the time that the event(s) happened (Courtney; col. 4 lines 54-67 and col. 5 lines 1-17). Courtney does not teach the feature of "determining a busy time for said route, where the busy time represents a time when a number of trajectories for said plurality of objects along said route is greater than a threshold number" nor teaches "determining a periodicity of at least one trajectory in a route." Krause et al. teaches to obtain the number of vehicles in a sector based in a sector of traffic to see if there is a traffic hold up (Krause et al.; abstract). It would have been obvious to one skilled in the art based on Courtney's disclosure and the teaching of Krause to modify the system wherein the events of object motion/trajectories can be determined to see when it is/are the busiest time(s), how often it is happening/periodicity/frequency, how many objects involved, etc.

Regarding claim 14: It is rejected for the same combination of reasons of claim 1 with claims 9 and 10.

D.) Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Courtney (U.S. patent 5,969,755), as modified by Gran et al. (U.S. patent 5,416,711), and further in view of Auty et al. (U.S. patent 5,809,161).

Regarding claim 7: Courtney discloses a system to determine multiple objects in motion within a video. Courtney further discloses to determine the objects entry and exit points (Courtney; col. 4 lines 62-67, wherein the entry and exit points are read as the source and destination points, respectively). Courtney, as modified by Gran et al., does not teach "wherein said source point and said destination point are determined using a clustering process". Auty et al. teaches to use cluster processing to obtain and classify certain points in an images of moving objects (Auty et al.; col. 12 lines 65-67 and col. 20 lines 20-35). It would have been obvious to one skilled in the art to combine the teaching of Auty et al., modified to determine the source and destination points using clustering, to the system Courtney, as modified by Gran et al., for tracking moving objects over a multi-lane carriageway (Auty et al.; col. 2 lines 53-55).

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anand Bhatnagar whose telephone number is (571) 272-7416, whose acting supervisor is Jingge Wu whose number is (571) 272-7429, Central fax is 571-273-8300, and Tech center 2600 customer service office number is 703-306-0377.

AB

Anand Bhatnagar

Art Unit 2623

August 14, 2005

SAMIR AHMED
PRIMARY EXAMINER